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EXAMINER	
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3623	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/491,461	DAGUM ET AL.	
	Examiner	Art Unit	
	Beth Van Doren	3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 May 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) *22-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12-14,16-21,31 and 32* is/are rejected.

7)☐ Claim(s) *11 and 15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The following is a Final Office action in response to communications received 05/16/2007. Claims 1, 12, and 21 have been amended. Claims 22-32 have been added. Claims 1-32 are pending in this application.

Response to Amendment

2. Applicant's amendments to claims 1, 12, and 21 are sufficient to overcome the 35 USC 101 rejections of claims 1-21 set forth in the previous office action.

3. Applicant's amendment to the specification is sufficient to overcome the specification objections set forth in the previous office action.

Election by Original Presentation

4. Newly submitted claims 22-30 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Previously presented claims 1-21 were directed to optimizing a multivariate representation of resources using multiple single variable representations and examining elemental blocks and reloading these blocks to determine an optimum level of resources as a function of solved maximums, whereas new claims 22-30 are directed to receiving relationship between an output value and a plurality of refinement quantity variables, receiving statistical information, and transforming the refinement quantities based on the statistical information, where the transformed quantities are used to optimize output values. Therefore, the transformation using statistical information is not required in claims 1-21 and the examining of elemental blocks and reloading of these blocks is not required in claims 22-30;

thus, there is burden on the examiner because the groups require a different search for the reasons set forth above.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 22-30 withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Allowable Subject Matter

5. Claims 11, 15, and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-10, 12-14, and 16-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Hillier et al. (*Introduction to Operations Research*).

As per claim 1, Hillier et al. teaches a computer implemented method comprising:

optimizing a multivariate representation of resources using multiple single variable optimizations (See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable), wherein the resources are used

in producing a set of products, and the resources, the set of products, and their respective connectivities being represented in a product space plan (See pages 595-7, wherein the plan is formed associated with a non-linear Expected Value Function (EVF) for optimizing a model that is associated with goods and resources (plants, people, finances)), the optimizing comprising:

converting a non-linear expected value function associated with the resources and products into a closed form expression (See pages 571, 592-4, and 596-7, which sets up the problem. See pages 568-571, which discloses a non-linear expected value function that is converted to be solved);

transforming the product space plan into a working transformed space plan, wherein the products are transformed into working elements (See pages 571, 592-4, and 596-7, which transforms the plan in a working plan, wherein the products become working elements of the objective functions);

performing a load step to form elemental blocks as a function of a single variable of the multivariate representation with elements being loaded with resources that gate production of the elements (See pages 571, 592-4, and 596-7, wherein a single variable is used and the equation is loaded with a value that controls production. The equation is solved);

examining the elemental blocks to determine if a first element has not been loaded with a corresponding first resource that gates production of the first element (See pages 571, 592-4, and 596-7);

if the examining indicates that the first element has not been loaded with the first resource, performing a re-loading step to form elemental blocks as a function of a single variable of the multivariate representation with the first element being reloaded with the first resource

(See pages 571, 592-4, and 596-7, wherein a single variable is used and the equation is loaded with another value that controls production. The equation is again solved);

solving for the maximum of each elemental block over each associated single variable of the multivariate representation, wherein solving is performed by a computer (See pages 592-4, and 596-7, and 606-7, wherein local and global maximums are solved and wherein a computer is used to perform the solving); and

determining and presenting the optimum level of resources as a function of the solved for maximums (See pages 592-4, and 596-7, and 606-7, wherein the optimal level is determined and the solution is presented).

As per claim 2, Hillier et al. discloses wherein the loading and re-loading steps result in an equilibrium configuration that provides the minimum amount of resources to produce any given amount of products across the whole plan (See pages 595-6, wherein the optimal level is determined).

As per claim 3, Hillier et al. teaches wherein the loading step further includes:

sequentially looking at each present work element (See pages 592-4, 596-7, and 606-7, wherein each work element is considered);

determining if each associated resource gates production of the element (See pages 592-4, 596-7, and 606-7, wherein a determination is made as to if a resource controls the element);

if gating occurs, then unloading the resource from a prior element if so loaded, and loading the resource onto the present element (See pages 592-4, 596-7, and 606-7, wherein if the controlling is not considered positive, a new value is loaded).

As per claim 4, Hillier et al. teaches wherein the reloading step further includes:

sequentially looking at each present work element (See pages 592-4, 596-7, and 606-7, wherein each work element is considered);

reloading each unloaded resource back onto the element (See pages 592-4, and 596-7, and 606-7, wherein the elements are reloaded);

redetermining if the element is gated by each reloaded resource (See pages 592-4, and 596-7, and 606-7, wherein a determination is made as to if a resource controls the element);

if the element is so gated, then merging the elements sharing each gating resource into a common elemental block which is a function of a single variable (See pages 596-7, which discloses the merging of the elements).

As per claim 5, Hillier et al. teaches wherein step of determining that gating occurs includes calculating a new maximum for the loaded element and determining if any remaining components further gate the maximum (See pages 594 and 596-8, which discloses loading elements and determining optimal and feasible solutions. These maximums are controlled by inputs. See also 606-7).

As per claim 6, Hillier et al. teaches wherein the step of redetermining that gating occurs includes recalculating a new maximum for the reloaded element and determining if any remaining components further gate the maximum (See pages 594 and 596-8, which discloses loading elements and determining optimal and feasible solutions. These maximums are controlled by inputs. See also 606-7. Loading the elements is an iterative process that attempts different combinations of variables).

As per claim 7, Hillier et al. discloses wherein the step of merging the elements results in an elemental block that is a sub-plan of the overall plan, but which is a function of a single variable (See pages 594 and 596-7).

As per claim 8, Hillier et al. discloses wherein the merged elements intersect at a common resource in the transformed spaces (See pages 594 and 596-7, wherein the merged elements intersect due to commonality in variables and constraints).

As per claim 9, Hillier et al. discloses wherein the expected value function represents a statistical expectation of the value function at a given resource allocation and for a given demand distribution (See at least pages 559 and 564-5, which discloses a non-linear expected value function, wherein the function represents the expectation of a value).

As per claim 10, Hillier et al. teaches wherein the transforming step involves taking a transformation of the product space to provide the working transformed space wherein the distribution induced on the resources is transformed into a distribution with zero mean and unit variance (See pages 577-578, which discusses optimizing a non-linear expected value function where the trial solution is varied by unit until the derivative is essentially zero).

As per claim 12, Hillier et al. teaches a computer-implemented method comprising:

optimizing a multivariate non-linear expected value function using multiple single variable optimizations, wherein the multivariate non-linear expected value function represents a statistical expectation of the non-linear expected value function at a given component allocation and for a given demand distribution (See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable. See also pages 595-7, wherein the plan is formed associated with a non-linear Expected Value Function

(EVF) for optimizing a model that is associated with goods and resources (plants, people, finances) based on an order for the goods), the optimizing comprising:

forming a plan in the product space associated with the non-linear expected value function which represents products, components, and connectivities therebetween (See pages 595-7, wherein the plan is formed associated with a non-linear Expected Value Function (EVF) for optimizing a model that is associated with goods and resources (plants, people, finances) based on an order for the goods);

transforming the product space plan to form a corresponding working space plan, with products corresponding to elements such that the distribution induced on the resources is transformed into a distribution with zero mean and unit variance (See pages 571, 592-4, and 596-7, which transforms the plan in a working plan, wherein the products become working elements of the objective functions. See pages 577-578, which discusses optimizing a non-linear expected value function where the trial solution is varied by unit until the derivative is essentially zero);

converting the associated expected value function into a closed form expression (See pages 571, 592-4, and 596-7, which sets up the problem. See pages 568-571, which discloses a non-linear expected value function that is converted to be solved);

performing a load step which loads each element with components that gate production of the element, wherein the loading step forms elemental blocks as a function of a single variable of the multivariate non-linear expected value function (See pages 571, 592-4, and 596-7, wherein a single variable is used and the equation is loaded with a value that controls production. The equation is solved. See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable);

examining the elemental blocks to determine if a first element has not been loaded with a corresponding first resource that gates production of the first element (See pages 571, 592-4, and 596-7);

if the examining indicates that the first element has not been loaded with the first resource, performing a re-loading step to form elemental blocks as a function of a single variable of the multivariate representation with the first element being reloaded with the first resource (See pages 571, 592-4, and 596-7, wherein a single variable is used and the equation is loaded with another value that controls production. The equation is again solved);

wherein the reloading step forms elemental blocks as a function of a single variable of the multivariate non-linear expected value function (See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable);

merging elements that are further gated by components that were unloaded, with the loading, reloading, and merging steps resulting in an equilibrium configuration (See pages 594 and 596-7, wherein elements are merged to determine the effects on Z);

solving the equilibrium configuration to determine the optimization of the expected value function, wherein the solving is performed by a computer (See pages 595-6, wherein the optimal level is determined and used to solve the optimization of the entire problem); and

presenting the optimization of the non-linear expected value function (See pages 595-6, wherein the solution is presented).

As per claims 13 and 14, Hillier et al. teaches a demand distribution including any multivariate demand distribution that is non-linear (See pages 559, 563-6, 570-1, which discloses

non-linear demand distributions with non-linear objective functions). Hillier et al. further discloses using simulation to solve OR problems, the simulations using probability distributions that include the normal distribution (See pages 900-1, 916, which discloses the normal distribution. The normal distribution is a special case within the family of elliptical distributions).

Claims 16-17 recite equivalent limitations to claims 3-4 and are therefore rejected using the same art and rational applied above.

As per claim 18, Hillier et al. teaches the equilibrium configuration includes configuring of the plan into elemental blocks which are a function of a single variable (See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable).

As per claim 19, Hillier et al. teaches wherein the elemental block is maximized over this single variable (See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable).

As per claim 20, Hillier et al. discloses wherein the optimum level of components to support the maximization are derived from the maximized elemental values (See pages 594 and 596-7, wherein the maximums determined support the optimal maximization of the entire problem).

As per claim 21, claim 21 recites substantially similar limitations to both claims 1 and 18 and is therefore rejected using the same art and rationale set forth above.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hillier et al. (*Introduction to Operations Research*).

As per claim 31, Hillier et al. teaches presenting the optimum level of resources as a function of the solved for maximums (See pages 592-4, and 596-7, and 606-7, wherein the optimal level is determined and the solution is presented). However, Hillier et al. does not expressly disclose that the optimum solution is stored in memory.

Hillier et al. discloses OR techniques used to determine optimal solutions based on expected value functions and constraints. It is old and well known in OR to implement these techniques utilizing software, with memory and processors, and to store solutions to problems solved using these techniques in order to increase the efficiency of solving the problem as well as increase the effectiveness of the determination of the solution by maintaining the outcome (so that it can be later used, reused, used as a benchmark, etc.). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention to story a solution in memory in order to increase the effectiveness of the determination of the solution by maintaining the outcome (so that it can be later used, reused, used as a benchmark, etc.).

Response to Arguments

9. Applicant's arguments with respect to the 35 USC 112, second paragraph, rejections of claims 11 and 15 have been fully considered and are persuasive. Therefore, these rejections have been withdrawn.

10. Applicant's arguments with regards to Hillier et al. (*Introduction to Operations Research*) have been fully considered, but they are not persuasive. In the remarks, Applicant argues that (1) the Office action does not clearly indicate what portion of Hillier is seen to be corresponding to a "first resource that gates production", and (2) that the cited portions of Hillier do not describe "examining elemental blocks to determine if a first element has not been loaded with a corresponding first resource that gates production of a first element".

In response to argument (1), Examiner respectfully disagrees. Examiner clearly indicated that pages 571, 592-4, and 596-7 of Hillier correspond to this limitation. Looking to these pages, these pages disclose constrained problems and constraints, the resource values associated with the problems being constrained. Examples of resources on these pages include raw materials, products, employees, equipment, etc. Therefore, these resources are what constrain production.

In response to argument (2), Examiner first points out that Applicant has not specifically pointed out how the language of the claims patentably distinguishes them from the reference. Further, looking to Hillier, Hillier discloses solving a problem by solving for values that are feasible and at optimum points. Solving such problems is an iterative process involving trying to find an optimum in the quickest and most efficient manner. Therefore, with branch and bound, each time an element is loaded, it is checked to see if it has or has not bound the element and corresponding resource. See pages 571, 592-4, and 596-7.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Beth Van Doren whose telephone number is 571-272-6737. The examiner can normally be reached on M-F, 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq Hafiz can be reached on 571-272-6729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

bvd
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